

CHEESE MAKERS' MANUAL

BY

D. M. MACPHERSON.

The EDITH *and* LORNE PIERCE
COLLECTION *of* CANADIANA





Queen's University at Kingston

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CHEESE MAKERS' MANUAL

DESIGNED TO GIVE SPECIFIC DIRECTIONS FOR MAKING FINE
CHEESE BY A NEW SYSTEM CALLED THE


TIME SYSTEM

WITH ADDITIONAL INFORMATION AS TO USUAL CAUSES OF FAILURE
IN MAKING FINE CHEESE, AND SOME SUGGESTIONS TO
GUARD AGAINST BY THE PRACTICAL CHEESE
MAKER.



By D. M. MACPHERSON,

*Proprietor of the Allan Grove Cheese Combination of
sixty-six factories,
LANCASTER, ONT.*



PREFACE.

The need of a practical treatise on cheese making covering the ground necessary to give a young cheese-maker a clear idea of the principals of practical cheese-making, has long been felt by the author and after fifteen years of close observation and experiment, he now offers to the public the enclosed ideas for careful perusal. Doubtless it contains many inaccuracies in dictum, yet it is hoped that some new ideas are given out such as will well repay for its purchase and perusal.

LANCASTER, April 12th, 1886.

75-101

CHAPTER I.

FORMULA ILLUSTRATED.

No. I.

This formula starts from milk and ends at pressed cheese. STAGE ONE is milk in its usual form, at a temperature suitable for application of rennet. STAGE TWO is the point where the curd thickens sufficiently firm to be cut with the curd knives, and allows the whey free access to pass out of the curd. STAGE THREE is the highest point of heat given to curd in process of making. STAGE FOUR is the point when the whey is taken off the curd and the curd made sufficiently firm by hard stirring; this is usually done at first show of lactic acid on "*Hot iron test.*" STAGE FIVE is a point selected for grinding and breaking up of curd for oxidation. STAGE SIX is time for application of salt and proper mixing of same. STAGE SEVEN is for hooping the curd and beginning to press into solid shape. STAGE EIGHT is the time pressing is usually completed and cheese removed to curing room.

No. 2.

The temperatures given at each stage are put down as degrees suited for best results in practical cheese-making. The temperature of setting with rennet is made low, to retain the most cream globules in the curd. The temperature of highest heat and drawing off whey is made to be just sufficiently stimulative to the rennet for expelling the proper amount of whey from the curd. The temperatures given from drawing whey to hooping, in stages four, five, six and seven, is a gradual, declining temperature, best suited for practical use and most convenient.

Percentage of moisture in each stage is also put or set down to give best results in practical use, and the most particular stages are at four and seven.

Time given at each stage, from four to eight, is based on the temperature. A change of temperature of each of the above stages necessitates a change of time. The length of time from stage one to four is not given, as this depends on the condition of the milk at time of setting ; it may take (if the milk is old, or newly changed to apparent acidity) only a few minutes, or it may take—if the milk is very fresh and sweet—four to six hours ; but from stages four to seven (with good, sweet milk) the length of time is always in proportion to temperature of curd at each stage.

PRINCIPLES OF THE NEW TIME SYSTEM OF CHEESE-MAKING ILLUSTRATED.

CHEESE

MILK

STAGES	1	2	3	4	5	6	7	8
TERMS	Setting Milk	Cutting Curd	Highest heat.	Drawing Whey.	Grinding	Salting.	Hooping.	Pressed Cheese.
TEMPERATURE	80 to 82	80 to 82	98	98	95	90	80	70
PER CENT OF MOISTURE	87	87	30 to 40	First show of acid on hot iron.	Half-inch on hot iron.	One and half hours.	One hour.	Twenty-four hours.
TIME
TEMPERATURE	80°	80°	98°	98°	95°	90°	80°	70°
TIME	More rennet.	Thirty Minutes.	3 to 40 Minutes.	First show of acid on hot iron. Plenty of hand stirring.	quarter inch on hot iron.	30 to 60 minutes after grinding, 2 lbs. salt	Half hour	Twenty-four hours.
PER CT. OF MOISTURE	87	87	30 to 40	4	4	4	4	3½
TEMPERATURE	80°	80°	98°	98°	95°	90°	80°	70°
TIME	X	Forty five Minutes.	30 to 50 Minutes.	First show of acid on hot iron. Four good hand stirrings.	Exact half-inch on hot iron.	One and half hours. 2½ lbs. salt	One hour.	Twenty-four hours.
PER CT. OF MOISTURE	87	87	30 to 40	4	4	4	4	3½
TEMPERATURE	80°	80°	98°	98°	95°	90°	80°	70°
TIME	X	Forty five Minutes.	30 to 50 Minutes.	First show of acid on hot iron. Four good hand stirrings.	Half-inch on hot iron.	One and half hours. 3 lbs. salt	One hour.	Twenty-four hours.
PER CT. OF MOISTURE	87	87	40	4	4	4	4	3½
TEMPERATURE	80°	80°	98°	98°	95°	90°	80°	70°
TIME	X	Forty five Minutes.	46 to 50 Minutes.	Quarter inch on hot iron. Plenty of hand stirring.	Grind twice. Half-inch on hot iron.	2 hours. 2½ to 3 lbs. salt.	1 to 2 hours.	Twenty-four hours.
PER CT. OF MOISTURE	87	87	40	4	4	4	4	3½
TEMPERATURE	80°	80°	98°	98°	95°	90°	80°	70°
TIME	More rennet.	15 to 30 Minutes.	10 to 30 Minutes.	Before on any acid shows on hot iron. Plenty of hand stirring.	Half-inch on hot iron.	One hour to quarter. 2½ to 3 lbs. salt.	1 to 2 hours.	Twenty-four hours.
PER CT. OF MOISTURE	87	87	30	4	4	4	4	3½

TWO MOST IMPORTANT DIVISIONS.

WHEY.

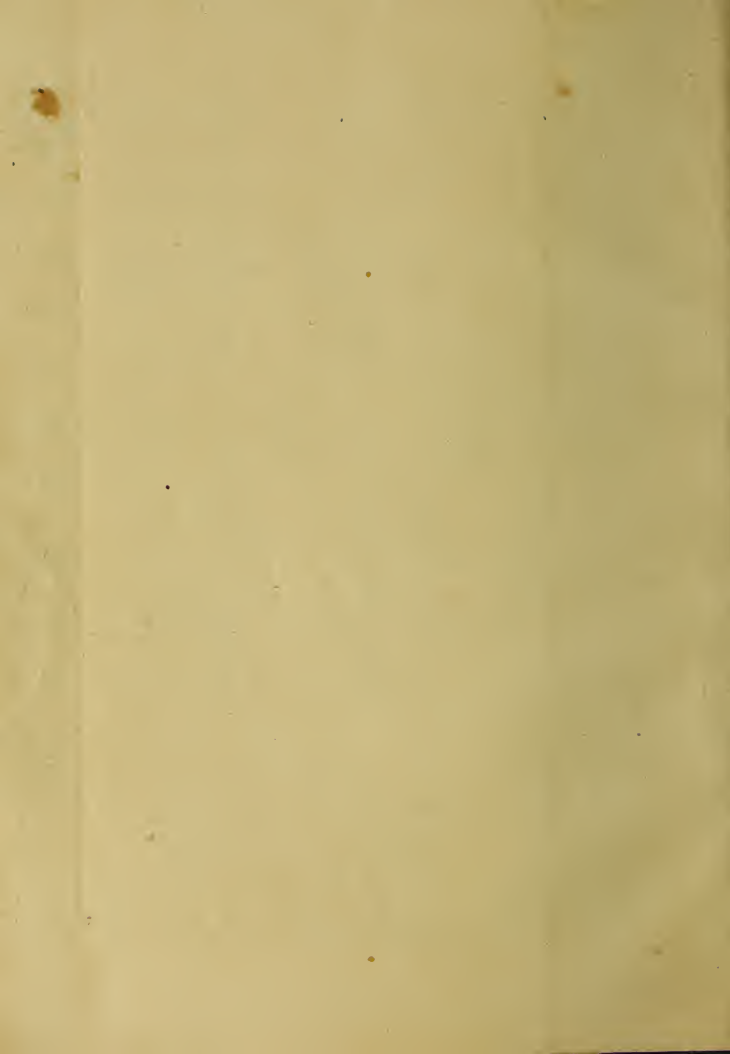
Expelling Whey out of Curd.

Action of rennet and lactic acid combined.

FERMENTATION.

Contraction of Curd in process of making.





The illustration given, dividing cheese-making into two distinct divisions, is based on—

First, the expelling *all* the surplus whey by the action of both rennet and heat ; and

Second, the combined action of rennet and lactic fermentation on the three remaining (*nearly equal*) parts of curd, (*butter, caseine, and moisture.*)

The illustration showing contraction of curd in making, and when the whey is drawn, is shown to give an idea of the importance of getting rid of all surplus whey at *Stage Four*.

CHAPTER II.

NECESSARY EXPLANATIONS.

No. 1.

The accompanying formula is based on the usual practice of cheese-making, and fully describes the system of making cheese by taking advantage of the laws of fermentation and rennet action. The most important points of cheese making are at Stages Four and Six ; all whey must be out of the curd at Stage Four, but not necessarily off the curd. Too much moisture in the curd, when the lactic acid shows first

on hot iron, does not agree with the rennet action. Instead of the proper moisture of the curd being taken up and assimilated with the caseine and butter, it is opposed by this too much moisture, and forms too much lactic acid inside of the particles of curd and produces a contrary effect of disintegration, which is shown in a sour cheese by being hard and brittle. The curd must be made firm and solid before Stage Four is reached. If the usual rennet action does not do it, then *Hand Stirring* is the next best. No time must be lost in getting rid of the whey and hardening the curd at this stage. If the curd is not firm and solid at Stage Four, it will be sure to be a sour, bitter, poor-flavoured and brittle-textured cheese. If the curd is heated above 98° the curd will get too firm, and a loss of average and quality follows; but at 98° the moisture is held by the rennet action, and the curd will not get too firm, even by extra hand-stirring all through the process, from the time the whey is drawn off. If a closer heat than 98° is obtained, the curd will likely hold too much moisture and make a soft, doughy, and pasty-textured cheese. This is why October and November cheese is usually this texture, because the curd being allowed to cool off before the rennet action contracts the curd sufficiently to expel the proper amount of whey; and so, being left in the sweet curd, it is assimilated with the caseine and

butter to form this objectionable character of cheese.

The times marked at the temperatures given are such as to produce the best results;—if a lower temperature of curd is allowed, then a longer time must elapse for the proper amount of fermentation. The warmer the curd the faster the changes progress after Stage Four, and the colder the curd the longer; hence the importance of keeping up a uniform heat as given. The thermometer should be used, and put into the curd at all stages to find out its temperature; the feeling of the hand is too liable to vary. All thermometers should be tested and proved correct at 98° before being used. This is *very important*, as one or two degrees either way may hurt the product very seriously.

Cheese-making is virtually divided into two distinct divisions: from one to four is for expelling the surplus moisture, and from four to eight is the action of fermentation and rennet action combined; hence the importance of getting rid of all surplus moisture up to Stage Four, and then maintaining uniform heat in the curd from Stage Four to Stage Seven, which, by experience gives the best results. The advantages of this system of making cheese for the English market is, that it can be easily changed to suit the requirements of time and place. If the cheese is too dry and hard, then a lesser time from Stage Four to Stage

Seven is required ; if the cheese is too soft and porous, then a longer time from Stage Four to Stage Seven is needed,— provided everything else in the manipulation is equal. It is necessary to note that the amount of rennet and the amount of heat kept in the curd is a very important factor. *Rennet* fills the office of expelling the surplus whey at certain temperatures, then retaining a certain amount of moisture to cure the cheese down to a salvy, rich, close, silky texture. *Heat* is used to assist this action of rennet in all its forms, also to bring on lactic fermentation to hold in check the too rapid action of the rennet in curing ; hence will be seen the importance of having some means of measuring the action of each agent to be used, to attain the best results.

The description of these principles in cheese-making is fully explained in each condition experienced in milk and curd.

CHAPTER III.

PRACTICAL APPLICATION.

HOW TO MAKE FINE, RICH, SILKY CHEESE FROM GOOD SWEET MILK.

Use a fair proportion of rennet ; thicken in ten to fifteen minutes ; cut in 45 minutes more ; begin to stir at once, and when curd is well healed over, heat to 98°, carefully stirring, and not let the curd settle on hot tin. Stir well for fifteen minutes after heating. Keep vat covered ; draw off whey at first show of acid on hot iron ; stir curd with hands from four to six times thoroughly, then pack thin all over vat. Cut into fairly large pieces and turn them over every fifteen minutes, using the thermometer in the curd at all times. Care must be taken to keep curd up to standard heat at each stage, using cover on vats at all seasons of the year. Grind when curd shows exact half-inch ; grind only once, if there are no pin-holes ; stir and air well, but keep up heat for one and half hours, then salt — 2½ lbs. to 1000 of milk, well stirred in ; then stir and air for one hour and put to press. Cap-cloths and press-boards well washed and kept sweet and clean ; — no sourness or acid should be on

the cap-cloth, press-board, or follower, as it causes the cheese to check and crack. Press gently at first, but increasing afterwards; press very hard last at night. Care must be taken to press evenly and squarely. Dress off corners when put to curing room. Grease but little and hand-rub often.

HOW TO MAKE DRY, HARD CHEESE.

Use small proportion of rennet ; heat up to over 100° ; cut very fine ; keep up heat to over 100° ; draw off whey early, and hand-stir dry curd continuously, keep up heat in curd, grind twice and salt high.

HOW TO MAKE AN EXTRA MELLOW, RICH CHEESE FROM GOOD, SWEET MILK.

Use a larger quantity of rennet ; cut coarse ; heat carefully and slowly ; stir curd while heating thoroughly ; draw off whey on first show of acid ; hand-stir the curd for three hours, not letting it pack, or one and half hours after the fifth stage is reached ; salt less ; air and stir curd more after salting, before pressing.

HOW TO HARDEN CURD QUICKLY.

Heat to 100° or over : cut very fine ; stir very hard in whey, hand-stir very hard after draining off whey at high heat, and maintain high heat throughout to salting.

HOW TO IMPROVE THE FLAVOUR OF CHEESE.

Have the milk well aired when fresh drawn from the cow, and not cooled to a lower temperature than the air surrounding it. *All pails, milk cans, receiving can and milk vat* must be thoroughly washed and scalded, likewise all utensils used in the stirring of the milk. Use perfectly pure, sweet-flavoured rennet, thoroughly well incorporated or diffused in the milk ; heat up curd even and uniform to 98° ; expel all surplus whey out of curd at stage four by hand-stirring ; keep heat of curd to degrees of temperature as stated in each stage ; use the thermometer to test temperature of curd by immersing it into the curd—*the hand will not do* to tell accurately enough ; air the curd well before and after salting ; thoroughly and uniformly apply the salt—a coarse sieve is the best to distribute salt on the curd ; have hoops, followers and press-boards well washed and scalded, sweet and clean ; dress cheese with pure flavoured whey oil ; keep

curing room an even temperature of 65° to 70° , and box up cheese, closely fitting the cover on to touch the cheese, at three to four weeks old.

HOW TO MAKE SOFT, MUSHY CHEESE.

Use plenty of rennet ; cut coarse ; stir gently while heating to 96° ; draw off whey early ; cool off curd as much as possible, and hand-stir but little till salt is applied.

HOW TO MAKE SOUR, LEAKY CHEESE FROM SWEET MILK.

Cut curd coarse ; heat to 98° very slowly ; draw off whey at sixth stage, salt at once and put to press.

HOW TO MAKE SOLID CHEESE FROM POROUS CURD AND TAINTED MILK.

Use less rennet ; cut finer ; heat to 98° ; stir very much while in the whey ; maintain this heat up to drawing off whey, at a quarter of an inch acid ; hand-stir curd for half hour after drawing off whey ; cheddar thin ; grind twice at half-inch ; keep curd warm ; hand-stir for two hours ; salt heavy, and then air and hand-stir from one to two hours.

HOW TO HANDLE SOUR OR OLD MILK AND MAKE
GOOD CHEESE.

Use more rennet ; cut finer ; heat faster to 98° in ten to twenty minutes ; draw off whey before show of acid on hot iron ; hand-stir considerably after whey is off, until the curd feels quite firm and squeaks between the teeth, then proceed as good curd—from half-inch of acid, or fifth stage.

HOW TO HANDLE SPRING MILK AND MAKE GOOD
CHEESE.

Use extra amount of rennet — one-third more than summer use ; cut ordinarily fine ; heat to 98° ; draw off whey at first show of acid ; hand-stir four to six times ; grind at quarter-inch acid, and keep curd warm to standard heat as per diagram ; salt after grinding in 30 to 60 minutes and press in one-half hour.

HOW TO MAKE A CROOKED, CRACKED SURFACE
CHEESE.

Press very hard at first, to cause the curd to burst up on one side of follower ; allow the press-boards, hoops and followers, and cap-cloths to become very acid and sour by not washing and scalding every two days.

HOW TO MAKE WHITE WHEY AND LESS AVERAGE
FROM MILK.

Stir milk and rennet until it first shows signs of thickening ; cut on soft side ; handle curd roughly while soft, and only at times — not continuously ; heat vat unevenly ; allow curd to settle and rest on hot tin, and allow acid to form in soft curd in the whey, then hand-stir very roughly.

HOW TO MAKE CLEAR WHEY AND GOOD AVERAGE
FROM MILK.

Stir rennet in milk thoroughly for five minutes, then perfect rest till ready to cut ; keep surface of milk warm by close cover on vat ; cut curd medium firmness ; cut uniformly and carefully ; cut on coarse side from half-inch to three-fourths blocks ; begin at once to very gently stir the curd ; heal over the surface of each particle by fifteen minutes continuous gentle stirring ; begin the heating slowly at first, gradually increasing as the whey forms, at the same time increasing the rapidity of the stirring ; stir sufficiently rapid to have curd appear at surface of whey at all times ; never let curds settle on to each other while curd is soft — this destroys the healed surface and fractures the particles to allow the cream to pass off

into the whey ; no curd should remain at rest on the hot tin : allow no matting or lumps of curd to form while heating ; gently stir up curd at times after heat is up—say every fifteen or twenty minutes ; draw off whey down to curd a short while before acid appears on hot iron ; keep curd up in heat to 96° or 98° ; hand-stir curd to harden it before acid appears on curd by hot iron test when whey is all drained off curd ; hand-stir curd until quite firm, and not allow it to pack into lumps until the curd feels firm, shotty, and squeaks between the teeth ; then cheddar thin over vat ; cut into pieces to turn over every fifteen minutes ; grind at half-inch acid ; be sure to have no free whey ; run off curd at time of grinding ; if whey runs off curd at time of grinding it is a sure sign the curd was not hand-stirred sufficiently after whey was drawn. Stir in salt evenly and well ; press very gently and slowly at first, gradually increasing by twenty-five minutes until the evening, when full pressure must be reached.

PRINCIPLES OF CHEESE-MAKING.

Rennet acts with greatest activity at temperature of 98° , is destroyed from 100° up to 140° , and remains dormant at 32° and under, but not destroyed. The action of rennet on sweet curd is to assimilate the

moisture, caseine and butter — mellow and ripen its parts by process of digestion when kept at a temperature of from 60° to 98° .

Lactic acid action on curd destroys the assimilating power of rennet, tends to overcome formation of gasses, and acts as antidote to prevent decomposition. Lactic acid must be held in abeyance to rennet action for best results. A small proportion of lactic acid is needful in cheese-making to kill ferments and maintain purity of flavour.

Lactic acid in the whêy has not so much injury on firm curd as on soft curd ; acid forming by too much whey inside particles of curd destroys its structure and prevents cheese from curing down rich and flaky. All surplus whey must be out of curd at Stage Four, or before the lactic acid takes hold of the particles of curd.

Hand-stirring of dry curd assists largely the rennet to expel the surplus whey, if curd is kept warm from 90° and 98° .

No amount of hand-stirring of curd below a temperature of 90° will expel too much moisture or whey for best results ; on the contrary, a temperature of below 90° hand-stirring will assist the rennet to assimilate the moisture if there is not too much lactic acid in the curd. Hand-stirring of curd from temperature of 90° to 95° improves the texture of the

cheese when curing, causes it to have a flaky, fine, silky grain — close, meaty and good-flavoured cheese. When from experience the cheese is too dry by a large amount of hand-stirring, it shows the curd was heated too high and kept too high in temperature ; if, on the other hand, the curd is too soft and rich, this proves that the curd was heated too low and then kept at too low a heat afterwards : these conditions are based on a proper amount of rennet being added at first.

A large proportion of rennet added to milk has a tendency to make a soft, rich cheese cure quickly and injures the keeping quality of cheese.

A small proportion of rennet added to milk has the effect of making a poor yield — a stiff, dry and hard cheese, and takes a long while to cure : the cheese generally dries out instead of curing.

SUGGESTIONS.

Porous and tainted curd is often produced by cows drinking impure water, or by impure and tainted rennet, or by tainted particles of decomposed milk in any form, or by milk being exposed to foul odours when cooled down to the temperature of the air.

The exposure of tainted curd to the air and a small development of lactic acid effectually overcomes the taint. The more severe the taint, the longer the exposure is needed.

Tainted and impure milk invariably produces less yield of cheese from the milk than sweet, pure milk.

Water in milk in large quantity injures the quality of the cheese. The rennet has not the power of expelling the water out of the curd as it does the whey.

Salt has the effect of prolonging the curing and preserving the flavour, and if a large quantity is used it prolongs curing — makes a hard, brittle cheese, and often produces that hot, biting flavour so often experienced in summer cheese. If too small a quantity is used the cheese cures too rapidly and goes off flavour at an early stage.

When curd is imperfectly agitated in the whey when the healing process is going on, it generally loses the cream in the whey, makes uneven quality of curd, hurts the flavour of cheese, and tends to make it brittle and crumbly when cut.

Sour cap-cloths, hoops, followers and press-boards act on the surface of the cheese to produce checked and cracked surface.

All thermometers should be tested if correct or not. It is very important to have correct thermometers for measuring the degrees of temperature.

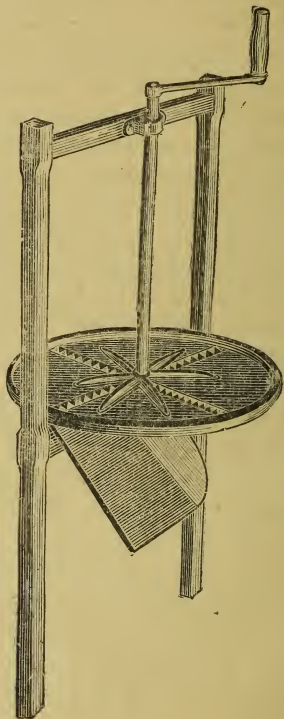
The hot iron test on curd is the best method of determining the appearance of acid in the whey. It is an infallible guide to determine when to draw the whey off the curd.

Vat covers are indispensable at all seasons of the year to preserve a uniform heat while the rennet is thickening the milk, and to preserve a uniform heat in the curd after the whey is drawn off the curd—in either the milk vat or curd sink.

Curd mills are valuable to assist the cheese maker to control the curd, and ensures a better average quality of cheese when properly handled.

Moisture in curd is regulated largely by the degree of heat used in the highest heat of the curd and the heat at each stage of manipulation. The higher the heat with the same amount of hand-stirring and degree of firmness of the curd, the dryer and less yield; and the lower the heat with the same conditions the softer and moister the cheese. This is the reason that October and November cheese are very often pasty and sticky—by the cooling of the curd to a low degree before being pressed. Coarse-cut curd requires more hand-stirring than fine-cut curd when the whey is drawn off, and curd requires to be made dryer and firmer with a knife curd mill than a peg mill or lever mill.

MACPHERSON'S NEW PATENT CHEESE
FACTORY APPLIANCES.



THE CURD MILL

Is a circular disc having an iron rim. In this disc are eight knives pressed to form and sharpened, having cross small knives attached to these eight knives, all of which are for the purpose of cutting the curd into small pieces, or thin strips which are usually one quarter of an inch thick and one inch wide. This circular disc is attached to an axle and crank, whereby it is either turned by hand or power. To the outer side of the wheel is attached the hopper for receiving the curd to feed it to the cutter. By this operation the curd is fed easily and by a sharp cutting edge, thereby not liberating the cream and at the same time freeing the gases and giving the greatest surface for aeration. One hundred pounds of curd can be passed through per minute with ease. The curd can be passed through this mill several times without injury or creating a loss by liberating the cream or butter.

BROCKVILLE, March 1st, 1884.

To all whom it may concern :

This is to certify that the "Macpherson" curd mill is giving the best satisfaction to all cheese-makers in this section of any coming under my notice. It works easily, fast, efficiently, and leaves the curd in the finest possible condition for salting, acitating and pressing.

D. DERBYSHIRE,
President Eastern Ontario Dairy Association.

REPORT OF COMMITTEE ON DAIRY UTENSILS AT THE
QUEBEC DAIRY ASSOCIATION.

ST. HYACINTHE, Nov. 13th, 1884.

D. M. Macpherson, of Lancaster, Ont., exhibits a curd mill, a curd and milk stirrer, and a milk cooler. All these articles possess undoubted merit. Not only must they be approved because of their simplicity of construction and evident adaptation for the purpose intended, but this committee has had the opportunity of knowing that they have given perfect satisfaction in actual use. The curd stirrer in particular, which is extremely simple and costs only two dollars and a half, is valued so highly by Mr. Archambault in his model factory that he would not take twenty dollars and be without it. One of our committee, Gabriel

Caron, himself, as well as Mr. Archambault, has a curd mill in use and finds it perfectly satisfactory, indeed, indispensable. We cannot too highly recommend these articles to the cheese-makers of the country, and we believe that their general use in the factories would add materially to the value of our cheese productions.

(Signed)

W. H. LYNCH,
GABRIEL CARON, } *Committee.*
JOS. LAURIER,

BROCKVILLE, Feb. 21st, 1885.

To all whom it may concern ;

This is to certify that the "Macpherson" rake, for stirring rennet into the milk and stirring the curd while heating, has proved the best thing out. By actual test it has produced more curd from a given quantity than any other curd stirrer, and is being generally adopted.

D. DERBYSHIRE,
President Eastern Ontario Dairy Association.

BROCKVILLE, March 1st, 1885.

This is to certify that I have used "Macpherson's" curd mill in over one hundred factories the past year and have come to the conclusion that it is the best mill now known ; and I appreciate it so much as to

order one of these mills for my own factory, although I purchased a new mill, the best known, two weeks ago. It is easy to operate, convenient, does the work perfectly, and does not start the white whey nor butter when the curd is put to press, even if the curd is passed through several times.

HOWARD BISSELL,
Cheese Inspector for Ontario, Canada.

BROCKVILLE, March 5th, 1885.

I take much pleasure to intimate to the cheese factory men at large that I have used Macpherson's Patent Curd Stirrer for the past year. It is a simple, novel and useful device, and cannot be too much appreciated for the stirring of milk, mixing of rennet in milk, and stirring of curd in whey for heating, which I am satisfied by its use in any ordinary large factory will save hundreds of dollars in one season alone, besides make a better article of cheese. I was appointed in a trial of having a scientific test the past year with the best power machines known, and after two days careful trial I was able to produce more cheese from the milk. The stirrer is cheap and easy to operate, and in my opinion no factory should be without one or more.

HOWARD BISSELL,
Cheese Instructor for Ontario, Canada.

HUNTINGDON, March 6th, 1885.

Knowing the value of good machinery in a cheese factory, I have no hesitation in recommending the "Macpherson" curd mill to all factorymen. It is specially adapted for a hand-mill, owing to the fact of its being extremely easy to operate. I have turned the mill, grinding at the rate of one hundred pounds of curd per minute, without any trouble. The principle of the machine is a *clean cut* and no squeezing or tearing process. The mill is in use in thirty factories under my supervision, and the cheese-makers will have no other.

J. A. RUDDICK.

HUNTINGDON, March 9th, 1885.

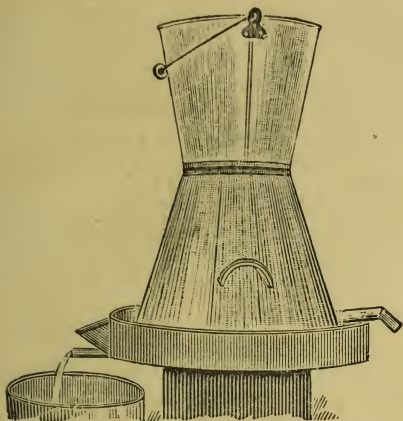
D. M. MACPHERSON, ESQ.
Lancaster, Ont.

DEAR SIR:—I have had considerable experience with your milk and curd stirrer, and I have no hesitation in saying that it does all that is claimed for it. When it is properly used it produces a boiling motion, and keeps the contents of the vat continually on the move, giving no chance for the curd to burn.

J. A. RUDDICK.

CURD STIRRER.

The Curd Stirrer is a simple device for stirring milk in the cheese vat, heating the rennet, and agitating the curd during the process of heating. It consists of a long handle with a cross head, this head having several long teeth, broad and thin at the bottom, gradually narrowing to top, where they enter the head. This form of the teeth when being used produces a boiling motion in the milk and curd from bottom to top. It is used by being pushed down one side of the vat and being pulled up the other, thus creating two distinct motions in the milk, or whey and curd. A current with a boiling motion is effected down one side of the vat and up the other. These motions give a very uniform heat to the curd, and at the same time do not fracture its surface, producing a loss of cream in the whey. Whey can be made as clear as water by this implement and proper method of using. The hands are not needed to be put into the vat of curd at any period of the heating or stirring.



The Milk Cooler is made up mainly in two parts. The base or large cope is used for holding the cold water, or ice combined ; the large pail on top of cone is a milk reservoir, with a strainer attachment inside. This pail is sufficiently large to hold a quantity of milk (five gallons) so as to prevent any delay in emptying the milk pails when full during the process of milking. It has a pressed concave pail bottom, with small holes around the outer edge three-fourths of an inch apart, the size of which is one-sixteenth of an inch. These holes in it act as distributors, allowing the milk to pass down on the outside of the tin cone holding the cold water in a thin sheet, all particles

thereby being partially cooled. The milk is then held in a reservoir at base of the cone to further the cooling process, and as the coldest particles settle to the bottom it is forced out at the spout into the milk can by the weight of milk being added from time to time. The whole milk is thereby thoroughly strained, aired, cooled, and emptied into the milk can in a perfect degree without labour or attention, at the rate of six hundred pounds per hour.

DUNDEE, Feb, 16th, 1885.

This is to certify that I have used D. M. Macpherson's patent milk strainer, cooler and aerator, for the past two years in my dairy of from fifty to sixty cows, and cheerfully state that it gives the best of satisfaction, so much so that I consider it indispensable. By its use I can keep all my milk from twenty-four to thirty-six hours without any difficulty in the hottest weather. As it requires no labor or attention to perform its work, I consider it a great labor-saving implement, besides the value of putting the milk in the best possible condition to give the highest results at the cheese factory. And as to milk delivery to towns and cities, I consider it would be very valuable indeed, as the

flavor is so much improved by the thorough exposure to the air while fresh and warm, and the cooling done so perfectly that it could not well be improved upon.

P. GARDINER.

HUNTINGDON, March 6th.

To Farmers and Dairymen :

All experienced cheese-makers know the necessity for having milk delivered in the best possible condition, in order to be able to turn out the "fancy" cheese which is sought after so eagerly by our buyers. Milk must be free from all taint and animal odors before the desired result can be accomplished. I know of no process which will tend more to this end than by using "Macpherson's" patent cooler, aerator and strainer. It is constructed on scientific principles and does its work perfectly.

J. A. RUDDICK,

Milk Inspector Allan Grove Combination.

CORNWALL, March 3rd, 1885.

I take much pleasure to certify to the value and usefulness of Macpherson's milk cooler and aerator, and cannot too highly recommend it for the putting of milk in the best possible condition to give good

satisfaction for the city milk delivery. The animal odor and heat being removed so quickly from the milk after being taken from the cows, leaves nothing to be desired ; and again, the working of the cooler is all done without any attention or trouble.

J. C. CONIBEAR.

WHEY FAUCET AND STRAINER.

An improved faucet for drawing off the whey from vat ; will empty a 600 gallon vat in ten minutes—drain the vat perfectly clean. Easily cleaned, and can be attached with ease to any ordinary cheese vat. Can be taken off or put on at will.

\$ 3.00

BANDAGE CUTTER

For cutting seamless bandage. Will cut one thousand to fifteen hundred bandages per hour, in uniform sizes and any breadth desired.

D. M. MACPHERSON,

Patentee and Proprietor.

